

THE REVIEW

DEVOTED TO THE INTERESTS OF THE AMERICAN SOCIETY FOR METALS

Volume X

MARCH, 1937

No. 3

Castings Used In 70 A.D. by Jap Builders

Not Developed, However, Until
1910, Says Davis

By Louie W. Mosley

Los Angeles Chapter—"High Strength Cast Iron" was discussed from a standpoint of development and present-day applications by M. T. Davis of General Electric's Ontario, Calif., branch factory on Feb. 11.

Briefly sketching the history, Mr. Davis stated that records are extant showing that cast iron was made in Japan as early as 70 A. D. for bridge links. Cannon balls were made of cast iron in the 13th century. It was not until about 1910, however, that cast iron began to undergo real development.

Cast iron is recognized and classified by the American Society for Testing Materials as No. 20, No. 30, etc., up to No. 60, these numbers representing the ultimate tensile strength of each class in thousands of pounds per square inch.

High strength cast iron has certain advantages over the ordinary type. It is more elastic and large sections are more reliable than those from the ordinary variety made in the past.

The four types of wear to which a metal can be subjected were classified as rolling contact wear, sliding wear, abrasion wear, where abrasive particles are rubbed against or impinge upon the surface of the metal, and wear due to erosion.

Against abrasion wear high strength cast iron in its "as cast" condition showed almost as much resistance as manganese steel. This resistance is still further improved by heat treating.

Mr. Davis mentioned several cast iron applications in which the high strength type was substituted satisfactorily for steel. The increased reliability of the new cast iron when cast in large sections was partly responsible.

The phenomenon of growth in cast (Continued on page 3)

Educational Program in Worcester Nets Members

The winter educational program of the Worcester Chapter was brought to a close in February.

Approximately 35 men completed the course which included illustrated lectures and laboratory work. Of the 35 men taking the course, 2 were old members of the Worcester Chapter, 14 men have made application for membership and 8 more members are assured from the class.

Twenty-two illustrated lectures on the subject of "Ferrous Physical Metallurgy" were offered during the course. The lecturers included Rodman Tatnall, Wickwire Spencer Steel Co., chairman of the Worcester Chapter; George Peterson, Pratt and Inman Steel Co., John Hitchcock, Morgan Construction Co., M. Lawrence Price, Worcester Polytechnic Institute, Warren Van N. Baker, American Steel and Wire Co., and A. A. Comedian, Crucible Steel Co. of America.

Convention Headquarters at Atlantic City On Committee

To Nominate New Officers

Seven Selected by President
From List of Candidates

In accordance with the constitution of the American Society for Metals, President E. C. Bain has selected the following Nominating Committee from the list of candidates submitted by the chapters:

Nominating Committee

G. V. Luerssen, *Chairman*, Carpenter Steel Co., Reading, Pa. (Lehigh Valley Chapter)

Carl G. Johnson, Oak Street, Westborough, Mass. (Worcester Chapter)

Irving C. Matthews, Eastman Kodak Co., Rochester, N. Y. (Rochester Chapter)

Edward G. Mahin, Department of Metallurgy, University of Notre Dame, Notre Dame, Ind. (Notre Dame Chapter)

J. M. Watson, 79 Monterey Ave., Highland Park, Detroit, Mich. (Detroit Chapter)

A. B. Beaver, Director of Research, National Cash Register Co., Dayton, O. (Dayton Chapter)

Kenneth H. Hobbie, Driver-Harris Co., 1140 West Washington Blvd., Chicago, Ill. (Chicago Chapter)

This Committee will meet during the third full week in the month of May, and shall name one candidate for each of the following offices:

President 1 year
Vice-President 1 year
Treasurer 2 years
Two trustees for 2 years each

The Committee will welcome suggestions for candidates. Endorsements of a local executive committee shall be confined to members of its local chapter, but individuals of a chapter may suggest to the Nominating Committee any individuals they so desire.

Endorsements should be sent in writing to the chairman or other members of the committee at the addresses shown above.



The Ambassador Hotel has been selected as official headquarters for the American Society for Metals during the National Metal Congress and Exposition in Atlantic City, Oct. 16 to 22, 1937.

Special convention rates at the Ambassador are: For single rooms \$3, \$4, \$5, and \$6, and for double rooms \$6, \$7, \$8 and \$10 per day European plan. American plan service can be arranged at a cost of \$4 per day per person.

Hotel reservations should be sent to W. B. Coleman, Atlantic City Convention Bureau, 16 Central Pier, Atlantic City, N. J. Be sure to mention the National Metal Congress and Exposition in making reservations in order to insure receiving the special convention rates.

Frank Enright Joins Holden Company As Director of Sales and Advertising

Was Advertising Manager for
Metal Progress Since
Its Beginning

It is with keen regret that the American Society for Metals has accepted the resignation of Frank J. Enright as advertising manager of Metal Progress. Mr. Enright has joined the A. F. Holden Co., New Haven, Conn. (manufacturers of salts for heat treating baths) as director of sales and advertising.

"Frank" has fostered *Metal Progress's* advertising since its birth over six years ago and his engaging and friendly personality and experienced capability have done much to bring it to its present lusty proportions. Twenty years with McGraw-Hill Publishing Co. on *Power* and *American Machinist* and as Detroit representative for the company gave him a firm background of experience to nurse the new publication's advertising department through its infancy.

His capability in this field along with a personality which, once known, is not forgotten, have combined to bring him a legion of friends. The American Society for Metals joins with these friends in tendering congratulations and best wishes in the new position with the A. F. Holden Co.

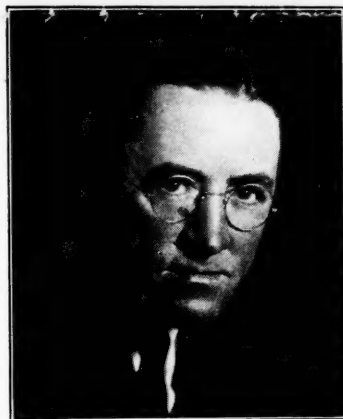
Steever Gives Forging Talk

By E. V. Peterson

North West Chapter—The February meeting featured a lecture on "Forgings" by Adam M. Steever, superintendent, Columbia Tool Steel Co., Chicago.

Various aspects of the forging field were covered including history, economics, modern presses and practices. The lecture was illustrated by slides.

Mr. Steever has had wide experience in many fields and his talk was thorough and interesting.



Frank J. Enright

St. Valentine Rewards Lonely Ladies With "Ladies Nite" Party at Chicago

By David R. Howerton

Roses are red
Violets are blue
Sugar is sweet
Etc., etc.

In all the surroundings of a gay Valentine Party, the annual "Ladies Nite" of the Chicago Chapter was held on Valentine's eve, Saturday, Feb. 13.

Table decorations, balloons and paper hats, together with programs and bouquets well in keeping with the spirit of a Valentine party, made the scene a colorful one. The gala event took place in the beautifully lighted Grand Ballroom of the Medinah Club on North Michigan Ave., the regular rendezvous for the Chapter members.

A delicious, seven-course, turkey dinner was served, accompanied by an elaborate floor show featuring Chicago's outstanding stars of radio and stage.

Music was furnished during dinner and throughout the entire evening by

Charles Gaylord and his popular broadcasting orchestra.

The fountain of youth, disguised as a refreshing punchbowl, poured forth its delicious contents continuously, which made it a most popular meeting place. Dancing and cards were enjoyed by those who wished to indulge, and door prizes were awarded to the lucky number holders.

Three hundred and eighty guests and members were present for this outstanding event, and all were of the same opinion—the most delightful "Ladies Nite" ever held by the Chapter.

The Entertainment Committee, headed by Paul Kertz, chairman, is to be complimented on its fine work in making one evening's entertainment suffice in rewarding the wives and sweethearts who spend so many lonely evenings because "I should go to this lecture."

THE REVIEW

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RAY T. BAYLESS.....Editor
M. R. HYSLOP.....Managing Editor

Cleveland, O., March, 1937

Volume X

No. 3

DO YOU KNOW THAT

THAT . . . the term "merchant bar" is derived from the practice, current 200 years ago, of purchasing general purpose steel from a peddler's sack or over a merchant's counter?

* * *

THAT . . . the latest house heating radiator is equipped with a specially designed cast iron panel which gives off solar radiations when the steam is turned on? So now we can get our mid-winter Florida tan without even a sun-lamp!

* * *

THAT . . . the art of coating cast or wrought iron with tin was known prior to 25 A.D., and that the first tin plate industry was established in Bohemia in 1240?

* * *

THAT . . . four billion gallons of water per day is consumed by the iron and steel industry operating at capacity—more than four times as much water as is consumed daily in all five boroughs of New York City? A solution to the flood problem perhaps?

* * *

THAT . . . most of the world's supply of titanium comes from sands on river banks in the interior of Brazil?

* * *

THAT . . . a firm out on the West Coast is experimenting with the production of welded all-steel houses completely built and finished inside the factory? Soon we'll be telling the clerk to "wrap up that one and I'll take it with me"!

* * *

THAT . . . the amount of steel in use in the United States is equal to 17,000 lb. per person? Good thing we don't have to carry it all around with us!

* * *

THAT . . . the five billion dollars spent by 60 nations for armament in 1934 has been more than doubled in 1936 to the tune of 11 billion dollars?

* * *

THAT . . . permanent awnings are now being made of copper or aluminum? Well, when we're old and gray, we'll boast to our grandchildren about the time we put the old canvas awnings up single-handedly—almost!

* * *

THAT . . . railroads running stream-lined trains report from 22 to 58% increase in passenger revenues? It's even getting so it's necessary to call several days in advance just to make a reservation on a day coach.

New Puget Sound Chapter Is First Fruit Of Bain and Eisenman's West Coast Trip



Chairman Gilbert S. Schaller of the Puget Sound Chapter at the Right and Secretary-Treasurer Monte E. Parker at the Left of A.S.M. President Bain.

Seattle, Feb. 23—At long last the promised visit of the President and Secretary of the American Society for Metals to the West Coast has materialized, and first fruits of that visit are the formation of the Puget Sound Chapter of the A.S.M. with headquarters in Seattle, Wash.

On Feb. 23 over 125 members and guests joined the eastern visitors at dinner at the Roosevelt Hotel.

Gilbert S. Schaller, associate professor of mechanical engineering, University of Washington, was elected chairman of the baby chapter, and Monte E. Parker, instructor, Seattle Vocational School, secretary-treasurer. Elected to the Executive Committee were Charles W. Dougan, Harvey Schwartz, A. Finlayson, James L. Avis, Phillip L. Bannan, Jr., E. J. Colbert, Lee T. Holt, Frank W. Dearborn, and L. S. Marsh.

Chairman Schaller presided and introduced President Bain and Secretary Eisenman. The President's lecture and Secretary Eisenman's talk outlining the services of the Society were appreciated and enjoyed by all.

Vice-President Waterhouse Gives Review Of Iron and Steel During Past 35 Years

By J. W. McBean

Ontario Chapter—At a bumper February meeting, guest speaker was A.S.M. Vice-President George B. Waterhouse of Massachusetts Institute of Technology.

Genial Secretary Eisenman, who had given the Executive Committee an outline of the operations and aims of the Society on the previous evening, also gave a brief talk combining the grave and the gay before catching an early train.

Dr. Waterhouse gave a review of the advances and changes in iron and steel metallurgy in the last 35 years, which time limitations confined principally to tool steels, steel making practice, alloy steels and heat treatment.

Practically all high grade tool steel 35 years ago was made by the crucible process. This followed a definitely prescribed practice which resulted in a very high grade of carbon tool steel. The cost was high, however, and the crucible has largely been superseded by the arc furnace and more recently by the high frequency induction furnace.

The arc furnace has the advantage of making a large quantity in one heat, and can use cheaper materials. Phosphorus can be removed in the slag, all



Compliments

To President Bain and Secretary Eisenman on the rapidity, efficiency and enthusiasm with which new A.S.M. chapters were organized during their recent whirlwind tour of the West.

—*

To Ohio State University on its selection of Charles E. MacQuigg as dean of the College of Engineering.

—*

To retiring Secretary Kurt Siems of the Cincinnati Chapter on his efficient and self-sacrificing service to the Chapter during the past two years.

—*

To A. F. Holden Co. on securing the services of Metal Progress's crack advertising manager, Frank Enright, as director of sales and advertising.

—*

To Prof. Charles Y. Clayton of Missouri School of Mines and Metallurgy on being one of the first to use Metals Handbook as a text in his classes.

Metals Handbook Committee Meets At 2-Day Session

The newly appointed Metals Handbook Committee had its first meeting in the National Office of the Society, Cleveland, on Friday and Saturday, Feb. 12 and 13. The following members were present: J. P. Gill, Chairman; R. L. Dowdell, S. L. Hoyt, R. H. Aborn, G. C. Riegel, Adam Steever, R. Van Horn, H. L. Maxwell, Jerome Strauss, C. W. Obert, and J. E. Donnellan, secretary.

This was the first time that Metals Handbook Committee has held a two-day meeting. A very extensive program was organized which will require 40 or more subcommittees to execute and which, when completed, will greatly enhance the value and usefulness of Metals Handbook.

The subjects considered for further study and development by the subcommittees covered the whole field of metallurgy with the exception of the non-ferrous program, which is under the jurisdiction of Jerome Strauss's Non-Ferrous Data Sheet Committee and has not as yet been completed.

Subcommittees and authors are now being appointed and an endeavor made to complete this program within the next year and a half, since it is estimated that the next edition of Metals Handbook will be produced the latter part of 1938.

Pinch-Hitter Speaks

MacDonald Substitutes for Chapman With Talk on Heat Treating

By F. J. Comerford

Rochester Chapter is fortunate in having in its ranks Frank MacDonald of the Ritter Dental Mfg. Co. Frank rates 100% as a pinch-hitter and substituted on Jan. 11 for Everett Chapman, who was unable to be present because of illness.

Mr. MacDonald gave a splendid talk on the problems of a heat treater. He began by stating that in the heat treating of steels the three major difficulties are scaling, cracking and distortion. He handled each of these problems separately and explained in a clear manner how they were overcome at his plant.

He cited many instances where, of two dies supposedly from the same stock and heat treated identically, one would be satisfactory and the other too soft. A check of both dies would reveal that chemical analysis was different.

Mr. MacDonald also touched on the subject of welding aluminum and stated that for years he has been able to do this successfully without the use of a flux.

Those who attended the dinner preceding the meeting heard an interesting explanation of the Old Age Security Act by J. Toole of the Central Security Life Insurance Co.

increased rapidly in five years, and a great variety of alloy steels developed using nickel, chromium, vanadium, silicon, manganese, and molybdenum.

The technique of polishing and etching, the use of the microscope, the iron-carbon diagram, and hardness testing methods have all been perfected in this period. Pyrometers and automatic furnace controllers have come into wide use.

Among the more recent developments are the use of controlled furnace atmospheres and magnetic testing to reveal internal flaws.

Group at Portland Sprouts Into Full Chapter Maturity

Fifty Membership Applications Are Received at End of First Meeting

Portland, Feb. 24—Only one day was granted to the Puget Sound (Seattle) Chapter of the A.S.M. to occupy the cradle of youth and to bask in the sunshine of admiration as the youngest chapter of the Society.

The Oregon Chapter was born without swaddling clothes into true glorious Oregon weather, and on its first day of life passed rapidly through the adolescent period to the full maturity of chapterhood.

The high spirit aroused by the visit of President Bain and Secretary Eisenman and the missionary work of those Oregon members already familiar with the services and work of the A.S.M. contributed to the formation of the Oregon Chapter with over 50 members signing the application for a charter.

President Bain's lecture was presented to over 100 diners at the Congress Hotel in Portland. The temporary officers elected to serve until the regular annual election in May are:

Chairman—Sam H. Graf, professor of mechanical engineering and director of engineering research, Oregon State College.

Vice-Chairman—Warren J. Ulrich, manager, Pacific Machinery and Tool Steel Co.

Secretary-Treasurer—Norton L. Peck, Columbia Steel Co.

Executive Committee—Dee M. Hampton, R. E. Neils, Randolph Simpson, H. E. Spieth, C. E. Thomas, and A. L. Wallace.

Enthusiasm for the new Puget Sound Chapter ran very high and over 50 applications for membership were handed in at the close of the meeting.

Officers of Newly Formed Oregon Chapter



Left to Right—A.S.M. Secretary Eisenman, President Bain, Chairman Sam H. Graf of Oregon Chapter, Vice-Chairman Warren J. Ulrich, and Secretary-Treasurer Norton L. Peck Snapped at the Bonneville Dam.

Boston and Springfield Chairmen Visit Worcester

Worcester Chapter—The February meeting was one of the best in many years. About 70 members and guests attended, including Chairman Walsted of the Boston Chapter and Chairman Stonerod of the Springfield Chapter.

After the usual dinner party Chairman Tatnall of Worcester introduced several of the newer members to the group.

Principal speaker for the evening was none other than the well-known fellow member and authority on alloy steel, H. J. French, in charge of alloy steel and iron development, International Nickel Co., New York.

Mr. French in his precise and interesting manner presented an exceptional talk on "Some Recent Developments Relating to Alloy Steels." Mr. French illustrated his talk with both lantern slides and sketches and described the important part that nickel has played.

Two Meetings Held At Peoria in Feb.

Talk on Steel Making, Movie Of Bay Bridge Presented

By T. P. Black, Jr.

Peoria Chapter—Program of the monthly meeting on Feb. 8 consisted of a talk on "Steel Making" by A. G. Forrest.

Mr. Forrest is a graduate of the University of Illinois and has been with Republic Steel Corp. for the past eight years as plant metallurgist in charge of the South Chicago works.

His talk was well illustrated by slides, and discussed the problems of the metallurgist in satisfying the customer as to the proper quality of steel to be supplied.

Technical chairman for the evening was J. R. Munro, Caterpillar Tractor Co. A.S.M. Past-President Bob Archer was also present and gave a brief talk in which he told a little about Mr. Forrest.

On Feb. 5 the Chapter viewed a talking motion picture on "The San Francisco Bay Bridge" through the courtesy of the American Bridge Co. and Carnegie-Illinois Steel Corp. C. E. Webb, chief engineer, American Bridge Co., provided explanatory comment.

This picture, which is in great demand throughout the country, covers in considerable detail the construction of this famous span. Mr. Webb has spent much of his time right out on the job and was therefore well qualified for the talk.

Remarks on Electric and O.H. Steel Follow Movie

By Walter M. Saunders, Jr.

Rhode Island Chapter—The Bethlehem Steel Co. sound movie on "The Making of Alloy Steel" was presented at the Feb. 3rd meeting.

W. A. Beck of the Advertising Department supplemented the narrative part of the film with a few interesting remarks about how the film was made, and Mr. Vannatta of the Metallurgical Department answered numerous questions following the movie.

Interest was evident in McQuaid-Ehn grain size, and it was brought out that fine-grained steels are invariably supplied, unless otherwise requested.

Mr. Vannatta stated that in his opinion electric furnace steels are over-rated, and cited the fact that enormous tonnages of open-hearth steels are consumed by automotive manufacturers. However, he felt that better high speed steels are produced in the electric furnace than in the induction furnace.

Metallurgists Indispensable In R.R. Plants

Locomotive Makers Produce Their Own Steel

By D. F. McFarland

Penn State Group—"The Work of the Metallurgist in the Production of Railroad Equipment," subject of the meeting on Feb. 10, dealt principally with the manufacture of locomotive parts. Speaker was J. D. Tyson, chief metallurgist for the Standard Steel Works Co., the steel making subsidiary of the Baldwin Locomotive Co., located at Burnham, Pa.

Mr. Tyson briefly traced the history of the locomotive from the small primitive machine of the early 19th Century, made of cast iron and wrought iron with only a little expensive crucible steel, to the all-steel locomotive giant of the present day.

Locomotive makers make most of the steel they use, in contrast to automobile makers who usually buy steel in semi-finished form and shape and treat it for their own purposes.

Functions of Metallurgist Outlined

The many and varied uses of steel in the locomotive have made the metallurgist more and more necessary. Mr. Tyson outlined the functions of the locomotive steel plant metallurgist under the following headings: (a) Quality and composition control of all raw materials, (b) process control in the manufacture and fabrication of the steels, (c) quality control in all products, including final inspection and testing, (d) field contact work—cooperation with the technical staff of the customer railroads, (e) service work to customers, and (f) research and development work.

Each of these fields was briefly outlined and a series of typical examples of research development projects was described.

Thermal Cracking in Wheels Solved

Among the problems mentioned was the improvement of wheels to adapt them to the enormously increased loads and high speeds of modern traffic. The "shelling" of wheel surfaces is overcome by heat treatment which increases the fatigue resisting properties of the steel in the rim.

The solution of the problem of thermal cracking in wheels, caused by overheating of the rims through contact with brake shoes was described.

Improved reciprocating machinery parts of higher intrinsic strength and lesser weight have been developed to lessen the effects of greater inertia produced by higher speeds of operation. The tendency is toward more intelligent utilization of alloy steels.

One-Piece Castings Used

Locomotive frames are now usually a one-piece casting rather than a structure composed of smaller cast sections bolted together. Welded structures are being used experimentally.

The problem of shrinking wrought steel tires onto cast steel wheel centers was discussed.

The meeting was held in the Mineral Industries Building of The Pennsylvania State College, with 40 persons in attendance.

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Super Scholarly Students of Steel Assemble for Advanced Seminar

By David R. Howerton

How are bands formed?

How and why is fine pearlite formed on some quenches?

What, if any, are the constituents that are soluble in austenite?

No, gentle reader, not a questionnaire for the super scholarly students of steel subjects, but instead just a few of the questions and subjects discussed at the second meeting of the Advanced Educational Seminar held by the Chicago Chapter on Feb. 2.

The subject, "Transformation and Hardening of Steel," was given initial discussion by two of Chicago's outstanding metallurgists, Dr. M. A. Grossmann, director of research, Carnegie-Illinois Steel Corp., and H. B. Knowlton, metallurgical engineer, International Harvester Co.,

Dr. Grossmann, as the first speaker, discussed the process and results of austenitic transformation at constant temperature, which included the method for studying the rates of reaction which take place when a piece of steel is quenched from above its critical temperature.

In this method of studying reaction rates in steel, a suppressed quench is employed for a given time followed by a water quench. A new acicular constituent found in steels subjected to this suppressed quench was discussed.

Mr. Knowlton touched on such subjects as the impurities and constituents soluble in austenite, the formation of bands in hypo-eutectoid steels, the for-

mation of "fine" pearlite, and the migration of carbon through gamma iron.

With the above subjects as a basis, intense discussion was carried on until closing time was announced. The session could probably have continued for hours.

Because interest in these seminars has been so keen, one more will be held, the date to be announced later.

Los Angeles Meeting

(Continued from page 1)

iron was explained and some slides shown in which the growth was readily detected with the eye. Heat is the usual cause of growth, and the use of carbide forming alloys was recommended to increase the resistance of cast iron to heat. The austenitic form of cast iron is more heat resistant than the ferritic form.

In the discussion, one of the members stated that 4% molybdenum cast iron, heat treated to a Brinell hardness of 321, is more resistant to sandblast abrasion than any other material found in a series of recent tests.

Professor Clapp of California Institute of Technology brought the discussion to a close with the statement that for years the amount of blast furnace pig has doubled each year, and that in the face of stiff competition from other ferrous materials and from other structural methods, cast iron has continued to enjoy increased use, and is here to stay.

Many Products Are Made With Metal Powders

Complete Discussion of Powder Metallurgy Features New York Meeting

By F. H. Clark

New York Chapter—A large group turned out for the meeting on Feb. 15 to hear a discussion on "Powder Metallurgy" by Gregory J. Comstock, assistant manager of research and development, Handy and Harman, Inc.

The Chapter was fortunate in having Charles Hardy, president of Charles Hardy, Inc., as technical chairman.

Mr. Comstock said that the field of powder metallurgy has developed largely through the manufacture of tungsten and molybdenum, since these metals have to be pressed and sintered in powdered form before being drawn into wire.

In general, the process includes mixing the powders, pressing them in suitable dies and either simultaneously or subsequently heating them to promote adhesion of the metal particles. The degree of heat applied may be sufficient to melt one of the powdered constituents or it may alloy the powdered constituents by dispersion or may simply promote adhesion of contacting particle surfaces.

Contact Points a Powder Product

Among the powder products which are now being produced may be mentioned the ductile powder compositions which are used as contact points in current interrupting devices. These include combinations of silver and molybdenum, silver and nickel, silver and graphite, and other special compositions which have been found to be advantageous for this type of application.

From this point, the discussion consisted of questions from the floor.

Mr. Hardy said that bonds between metals may be formed in various ways. A bi-metal of silver on copper is made by formation of a eutectic layer between the two metals. A nickel coating on steel forms because an alloy layer between the two sheets is produced.

Metals may be considered powdered when they will pass a 100-mesh sieve. Metals passing a 325-mesh sieve will have a maximum particle size of about 43 milli-microns in diameter, but many powders are produced commercially today with a particle size of $\frac{1}{2}$ to 1 millionth of an inch in largest dimension.

There are several ways of producing metal powders. Aluminum and tin may be powdered by a spraying process.

Production of Powders

The usual methods are (a) reduction of the oxide, (b) chemical precipitation, and (c) electrolysis in the presence of an inhibitor to prevent a uniform metallic deposition.

Reduction processes, according to S. L. Hoyt, metallurgist, A. O. Smith Corp., who spoke informally from the floor, tend to produce porosity in metal powders, as, for example, in the reduction of tungsten powder from its oxide.

To determine the size and shape of metallic powders is not an easy task. Volumetric measurements of a known weight are used for comparisons of samples with different particle sizes. Comparisons can also be made on the rate of settling of a definite weight of powder from a suspension in some solution.

In Mr. Comstock's opinion, one of the

Thum Lectures On Atmospheres For Carbon Steels

By David R. Howerton

Chicago Chapter—In response to the appeal for better cooperation by the members in making reservations for dinner, well over 300 responded for the meeting on Feb. 11—a fact that helped make the turkey dinner with "all the trimmings" even more delicious.

Entertainment after dinner was provided by the Carolers of Carnegie-Illinois Steel Corp. This fine group of men's voices was well received. The words of two of the numbers presented were written by Herman Schultz, well-known to all the Chapter.

Chapter Secretary Ken Hobbie, acting as sales representative of the Bacchus Comfort Co., presented for approval his new, modern, universally applicable line of doddlers, whistles and johnnies in which could be found models to satisfy every whim and desire of a critical customer.

C. H. Stevenson of the Lindberg Engineering Co., acting as technical chairman of the meeting, introduced the speaker of the evening, Ernest E. Thum, editor, *Metal Progress*, who addressed the Chapter on "Controlled Atmospheres."

From the number in the audience who were intently taking notes, it was evident that this lecture was received with genuine interest.

Mr. Thum limited his subject to discussion of controlled atmospheres of furnaces treating carbon steels, and in this field he cited a few particular applications. It was the belief of the lecturer that the principal furnace companies of today are not spending the time and effort they should in studying the fundamentals of this problem.

The old method of using a gas to heat a furnace as well as to control its atmosphere is not successful, Mr. Thum stated, since the hydrogen oxides and the carbon oxides in combustion gases do not hold the oxygen tightly enough to prevent oxidation of the hot steel.

Several commercial methods of producing atmospheres of nitrogen and hydrogen, or nitrogen and carbon monoxide were discussed.

Gill Proves to Be Stellar Attraction at Youngstown

By B. F. Anthony

Mahoning Valley Chapter—The dinner preceding the meeting was attended by 28 members and friends who gathered to meet the speaker, J. P. Gill, before presentation of his paper on High Speed Tool Steel. The audience had grown to 100 by time for the lecture.

Gill's topic covered the history, development and manufacture of high speed tool steels and touched on some of the applications. He ably covered a considerable field and the interest created was demonstrated by the numerous questions asked and the heated discussions evoked.

Mr. Gill was further besieged by questioners after the meeting had to be terminated, so another credit mark is due Program Chairman Walters for having provided another "stellar" attraction.

most important possibilities presented by powder metallurgy involves the production of ferrous powder products for application as a super tool material. The possibility of producing intermediates between the present cast tool materials and the hard cemented carbide materials seems to him to be one of the most promising fields for powder research.

Accuracy of Coin Forging Often Eliminates Need for Machining

Progress in Non-Ferrous Forgings Attributed by Friedman to Machine Tool Builders Who Designed Rigid Equipment

By R. E. Christin

Columbus, Dayton and Cincinnati Chapters—The trend of the metal-working industry is toward coin forging, resulting in accuracies which reduce machining and often entirely eliminate it, was declared by J. H. Friedman, vice-president, National Machinery Co., in his talk on hot and cold forging machines given before the tri chapters in February.

Another important announcement made by the speaker was the rapid advancement of the non-ferrous industry, which had been "marking time." This progress may be attributed to the machine tool builders, who have designed rigid machinery to produce accurate forgings on a commercial basis.

Numerous samples of hot, semi-hot and cold forging made on horizontal and vertical type forging presses were shown. Hot and cold forgings produced from a slug of metal and forced

under extreme pressure into intricate dies are a recent development.

The connecting rod, for example, required proper balancing and locating of the center of gravity in order to be placed in matched sets for a motor. Methods formerly included the machining of the entire surfaces in order to meet tolerances.

Only in the last three years has it been possible to eliminate these costly operations and inspections by proper coining in a die. The present-day presses coin forge connecting rods to within ± 10 grams in weight at much lower cost.

100,000 Production Is Average

Those engaged in hot forging, according to Mr. Friedman, jump at the chance to cold form suitable pieces, such as carriage bolts, step bolts, or plow bolts, because of the higher die life possible. Where a production of 25,000 pieces to an impression is considered good in hot forging machines, 100,000 is only average in cold forming.

Making bolts by the double extrusion method has proven that higher tensile strengths are possible without heat treatment than in the conventional method of cold heading.

The blank used for a $\frac{1}{2}$ -in. bolt is $\frac{3}{8}$ in. dia. It is extruded through a carbide die to $\frac{1}{2}$ in. diameter, followed by a second extrusion to the rolled thread pitch diameter while upsetting the head from the $\frac{3}{8}$ -in. section.

Bolts are headed, double extruded, trimmed, machine pointed and rolled threaded all in one machine at a rate of 70 to 100 pieces per min.

Hot forgings made from a slug on modern, high speed, extreme pressure presses show relatively higher die life than formerly because of rapid ejection of the forging from the die and the short contact of the hot slug with the die. In cold forming and straightening it is always necessary to exceed the elastic limit of the material so the forgings do not distort after ejection from the die.

Freedom From Spring Important

Other discussion led to the fact that greater accuracy is also being obtained from hot forgings with little or no flash by employing carefully weighed blanks and by proper alignment of piercing tools and dies and the use of high speed, rigid machines.

One of the former drawbacks in hot and cold forging operations was the springing of the machines. It has been a false theory that metal required time to flow into an impression. The more rapid the operation, the more accurate the product when there is rigidity and freedom from spring in the machine.

A motion picture of two reels illustrated the operations, hot, semi-hot and cold, on horizontal and vertical presses of ferrous and non-ferrous materials. Presses handling 1 to 7 $\frac{1}{2}$ -in. diameter stock making forgings weighing as much as 100 lb. were shown in operation.

This informative talk, accompanied with samples of various products and a motion picture, certainly was instructive and held the interest of all.

FOR SALE

One Scimitar Microscopic Camera Complete, two Ainsworth Balances and several other items of laboratory equipment. Material can be seen at our plant.

W. A. Riddell Corporation.
Bucyrus, Ohio

Joint Meeting Held in Philly

Members of A.S.M. and of Welding Society Hear Chapman and Eisenman

By Adolph O. Schaefer

Philadelphia Chapter's regular January session took the form of a combined meeting with the Philadelphia Section of the American Welding Society. Consequently a large turnout thoroughly enjoyed Everett Chapman on "Welding" and Bill Eisenman on "Facts and Figures." (The title of the latter paper is our own invention.)

Mr. Chapman's paper dealt principally with "stress raisers" and their pernicious effects. Various types and practices in welding were described, hidden dangers were revealed, and means of overcoming the difficulties were proposed.

Certainly no one left without an increased knowledge of welding, and a greater respect for the work of the welding engineer. The speaker's practical acquaintance with his work was thoroughly appreciated by the audience.

Bill Eisenman's knowledge of the affairs of the Society, the personal habits of every member, and modern farming entertained a large dinner crowd prior to the meeting.

York Invited to Make Its Headquarters at College

By D. E. Flinchbaugh

York Chapter held its meeting of Feb. 10 in the Breidenbaugh Science Hall of the Gettysburg College.

Dr. Henry W. A. Hanson, president, honored the Chapter with a short address in which he extended a cordial invitation to the York Chapter to use Gettysburg College as one of their headquarters. The members applauded their appreciation.

B. L. Lewis of the Tinius Olsen Testing Machine Co. gave an illustrated talk on "Testing Materials" and the equipment used.

Mr. Lewis pointed out that the determination of physical properties of a material can be classed as an art and as a science. As an art certain equipment is required to carry out these tests. Machines of various types were illustrated to show this point.

The speaker also analyzed and interpreted general test results.

HERE AND THERE WITH A.S.M. MEMBERS

PAST director A.S.M., past chairman Tri-City Chapter A.S.M., member of the American Chemical Society, American Institute of Mining & Metallurgical Engineers, and American Society for Testing Materials, HYMAN BORNSTEIN now adds to this list of distinctions by being nominated for president of the American Foundrymen's Association.



Hyman Bornstein

"Hy" Bornstein is a product of the middle west. Born in Chicago, he attended Armour Institute of Technology. Armed with a chemical engineering degree and a law degree from John Marshall Law School, he became successively chemist for Union Pacific Railroad, chemist for Swift and Co., engineering chemist, City of Chicago, and an army captain in the Ordnance Department during the War.

The 1920's found him back in Illinois as chief chemist and metallurgist for Deere & Co. at Moline—a post he still occupies.

BACK to see his old alma mater will go CHARLES E. MACQUIGG on July 1, as dean of the College of Engineering at Ohio State University, where he was graduated in 1909.

Although he has been with Union Carbide & Carbon Research Laboratories since 1921 (director of research since 1934), Mac is not new to the pedagogic profession, having been head of the Department of Metallurgy at Pennsylvania State College for five years, prior to the World War. He is a past chairman of the New York Chapter A.S.M.

Lewis Describes Gage Pioneering

Tells of Precautions in Making Fine Measuring Tools

By Gordon Sproule

Montreal Chapter—The combination of a famous name with a subject of daily importance to most metalmen brought a record crowd to the February meeting, when Herbert B. Lewis, manager, Small Tool Division, Brown & Sharpe Mfg. Co., spoke on "Fine Measuring Tools—Gages and Gaging."

The talk was preceded by motion pictures illustrating the operation and control of various milling machines; these machines might now be described as "super-universal," "super automatic" and a few other "supers."

Imported Gages Not Uniform

Mr. Lewis described how, in the early days of Brown & Sharpe, they imported a set of standard plug-and-ring gages from Sir John Whitworth in England. Later, when a second set was imported, discrepancies were found between the two sets which were not ascribed to wear. Brown & Sharpe then decided to manufacture gages themselves, and thus became the American pioneers of standard gages and other precision tools.

Mr. Lewis showed the development of micrometer and vernier calipers, and large comparators.

He made it clear that his principals did not pretend to work to millionths of an inch, but that it was necessary to be able to observe millionths when working to hundred-thousandths. This is done by means of wave-lengths of

ASSISTANT sales manager for Lindberg Engineering Co. is the new position of L. A. SHEA, formerly Chicago district manager for Hevi Duty Electric Co. He has been with Hevi Duty for 11 years, most of his time having been spent in the engineering department.

NICHOLAS A. ZIEGLER, who was made research engineer for Crane Co., Chicago, on Jan. 1, was born in Russia but came to the United States in 1916 and graduated from Columbia University in 1921. He obtained a metallurgical engineering degree in 1924, and after a short time with Crucible Steel Co. of America, became associated with Westinghouse Electric & Mfg. Co., Pittsburgh, as research engineer.

Mr. Ziegler was made co-recipient with T. D. Yensen in 1935 of the Henry Marion Howe Medal for the best paper published in *Transactions* the preceding year.

F. LLOYD WOODSIDE, formerly of the Ludlum Steel Co., is now connected with the research laboratories of the Climax Molybdenum Co. of Mich., Detroit. His work will be in the development of molybdenum high speed steel and hot work die steel, as well as other types of tool steel.

"Lloyd," as he is known among the boys, has been a consistent worker in the Detroit Chapter, and was among the first members of the old Steel Treasures' Research Club.

light, using "optical flats" and other optical apparatus.

When an optical flat is laid on a plane surface the occurrence of colored "Newton's rings" (bands and fringes) indicates inequalities that can be estimated in millionths of an inch.

Mr. Lewis showed and described the constant-temperature room where precise comparisons are made. Heat radiated by a man's unshielded body will quickly affect such measurements.

Invar Not Used for Gages

Gages and other fine tools are made of carbon steel and stainless steel. Invar, the nickel-iron alloy with zero coefficient of thermal expansion, is not used, both because it cannot be hardened and because, paradoxically, it can only be used at ordinary temperatures. A steel part made to size with an invar gage at sub-normal temperature would be oversized at ordinary temperatures, whereas steel gages and steel parts vary equally in dimensions with temperature changes in process, and parts so made will be correct at ordinary temperature.

Tempered steel gages and scales are "aged" by repeatedly heating and cooling in baths at the freezing and boiling points, to relieve hardening stress and so eliminate danger of slow change in dimension after calibration.

Scales are calibrated by coating with varnish, engine dividing by lines scribed through the protective coating, and then etching in acid.

New Address for Electro Alloys

The Cleveland address of Electro Alloys Co. has been changed to 5005 Euclid Ave. Harrison I. Dixon, sales metallurgical engineer, is the Cleveland representative.

ARTHUR L. COLLINS, who has been appointed to assistant sales manager for Horace T. Potts Co., Philadelphia, has been manager of the tool and alloy steels division for ten years. A graduate of Stevens Institute of Technology in 1914, he entered the Potts organization in 1922.

Mr. Collins has been extremely active in the work of the Philadelphia Chapter, having served for five years as secretary-treasurer of the Chapter and one term as chairman. He is now a special lecturer at Temple University on "Steels and Their Applications."

THE pressure of daily work along with the necessity of performing his duties as secretary-treasurer of the Cincinnati Chapter at night has affected the vision and general health of KURT SIEMS, sales engineer, Cincinnati Milling Machine Co., and forced him to resign his position as Chapter secretary.

GEORGE GERDES, Cincinnati Milling Machine Co., has been appointed assistant secretary for the remainder of the season.

Mr. Siems has been assured that his condition need not become serious if he follows instructions and obtains both mental and physical rest after his day's work.

F. M. GLOYD, general superintendent, the A. A. Simonds Dayton Co. Division of Simonds Worden White Co., died Jan. 1 in Dayton, Ohio. Mr. Gloyd had been a member of the A.S.M. since 1927.

Cast Iron Interests Men in South Bend

McElwee Discusses Example of Misleading Specifications

By Walter C. Troy

Notre Dame Chapter—At the meeting on Feb. 10, Bernard J. Keffler was elected vice-chairman to fill the vacancy left by the resignation of Jack C. Walton.

The address by R. G. McElwee, foundry engineer for the Vanadium Corp. of America at Detroit, was one of particular interest to many foundries and equipment shops in South Bend.

The error of misleading or impertinent specifications is present in cast iron as well as in other materials.

For example, in the malleable iron specification for the differential carrier in automobile rear axles, the material is commonly specified in terms of elongation. However, since a deformation of a few thousandths of an inch would result in noisy service, a more sensible specification would be high elastic limit.

Elongation, it is true, gives an indication of toughness, but high elastic limit is the property more closely associated with the part.

Addition of Titanium

An interesting paradox concerning the addition of titanium was commented on in the discussion. Up to 0.17%, titanium promotes graphitization, although it is known to be a strong, stable carbide former.

This point is explained by the deoxi-

THE Fourteenth Howe Memorial Lecturer for the American Institute of Mining and Metallurgical Engineers needs no introduction to members of the A.S.M.

PAUL D. MERICA, vice-president of the International Nickel Co., Inc., has long taken an active part in Society activities, was a director in 1925-26 and a member of the Finance Committee last year.

A full-length biographical appreciation of him appeared in the May 1936 issue of *Metal Progress*.

The title of his lecture, which was presented on Feb. 18 during the annual meeting of the A.I.M.E. in New York, was "Progress in the Improvement of Cast Iron and the Use of Alloys."

A NEW division has been formed in the Wire Association devoted to cold working of metals and cold finished products. Picked to head this new division as chairman is B. L. MCCARTHY, for 20 years chief metallurgist and chemist at Wickwire Spencer Steel Co., Buffalo, N. Y. Mr. McCarthy has been secretary-treasurer of the Buffalo Chapter A.S.M. since 1934.

THEODORE B. BECHTEL, sales engineer for Electric Furnace Co. and member of the Chicago Chapter, died on Feb. 7 at his home in Salem, Ohio.

dizing effect of small additions of titanium.

If, on the other hand, the addition is high (over 1%) its deoxidizing function is completed and further additions may harden the cast iron, as is expected of such a stable carbide former.

Western Society Of Engineers Is Guest of Chapter

Chicago Chapter—A meeting held with the Western Society of Engineers of Chicago, as evidenced by the huge crowd, proved to be one of the most popular meetings held by the Chapter to date.

The Western Society of Engineers is an organization founded in 1869 for the purpose of advancing the sciences of engineering in the interests of the profession, the employers and the community. It is with a realization of these aims and purposes that it has grown to be one of the outstanding engineering societies of the middle west.

M. W. Dalrymple, metallurgist, Bethlehem Steel Co., lectured on "The Making of Tool Steel." He presented a great many new and interesting slants on the methods of testing tool steel by manufacturer and customer.

Following Mr. Dalrymple's lecture, a motion picture with sound effects entitled "The Making of Alloy Steels" was shown. This motion picture follows the making of steel from the charging of the molten pig and scrap up to the rolling of the finished product. The Bethlehem Steel Co. is to be congratulated on this fine piece of educational development work.

Free Literature — Mail Coupon Below

Burner Economy

Interesting photographs and text are used by Surface Combustion Corp. to show that a choice of 47 different types and more than 400 different sizes is sure to give economy in operation. Bulletin Ca-51.

Conveyor Furnaces

Continuous chain belt conveyor furnaces handle miscellaneous parts without pans or trays—they are efficient, uniform, and flexible in operation. Improved furnaces of this type are described by Electric Furnace Co. Bulletin Aysx-30.

Micromax Model

A novel publication by Leeds & Northrup Co. has the effect of almost putting a half-size model of the Silver Anniversary Micromax recorder in your hands. Cut to the actual shape of the recorder, it can be opened out and the whole mechanism swung into place. Bulletin Ca-46.

Resistance Wire

A complete catalog of the various types of electric resistance wires made by Hoskins Mfg. Co. has been issued. Complete numerical data are included on all types, along with some fundamental facts about heating units. A handy, small size 48-page booklet. Bulletin Jyb-24.

Centrifugal Castings

Centrifugal casting of stainless, heat and corrosion resisting alloys eliminates impurities and cooling strains and permits thinner and more uniform walls than any other method. This is explained in a bulletin by Michigan Steel Casting Co. Bulletin Nx-84.

Cleaning Rooms

A catalog of designs for blast cleaning rooms incorporating many labor and time saving improvements making the blast room an unequalled mechanical device for low cost cleaning is published by Pangborn Corporation. Bulletin Ca-68.

Thermit Welding

Of interest to all who are concerned with welding, but of particular interest to students is a pamphlet of carefully explained and illustrated laboratory experiments in Thermit welding published by Metal & Thermit Corp. Bulletin Ca-64.

Inert Gas

The rapid development in the use of inert gases in industry during recent years makes a folder of Roots-Connorsville Blower Corp. particularly timely. It describes the Harrison inert gas producer—a fairly new but well-proven piece of equipment. Bulletin Ca-131.

Bessemer Steel

Jones & Laughlin Steel Corp. has for distribution reprints of the paper by C. C. Henning on "Manufacture and Properties of Bessemer Steel" that received the Robert W. Hunt Award of the A.I.M.E. during 1935. Bulletin Ca-50.

Nichrome Containers

The important part that containers play in economical and dependable carburizing is well known to metallurgists and heat treaters. A Driver-Harris Co. bulletin on Nichrome carburizing containers should therefore not be neglected. Bulletin Ca-19.

Cold Finished Bars

The importance of quality in cold finished steel bars is stressed in a small booklet by Union Drawn Steel Co., which describes the various types of carbon and alloy steels available in this form. Bulletin Ca-83.

Photo-Electric Cells

If you are not familiar with the wide field of applications for photo-electric cells and apparatus, send for this very interesting and complete booklet by Pfaltz & Bauer, Inc. covering the original apparatus developed by Dr. Bruno Lange. Bulletin Ca-142.

Die Blocks

A handy, small size spiral-bound leather notebook is a complete handbook on Heppenstall Company's die blocks. Valuable additional data are contained, as well as a few blank pages for memoranda. Bulletin Ca-122.

Pickling Inhibitors

A pamphlet describing the nature and use of Grasselli Inhibitors is offered to those interested in pickling steel. It not only describes the merits of these inhibitors, but also gives a table of inhibitor strengths for use in pickling various steels. Bulletin Ap-95.

The Review

7016 Euclid Ave., Cleveland

Please have sent to me without charge or obligation the following literature. Circle the numbers that interest you. It is important to write in your company or business connection when you return this coupon.

Name Title

Company

Company Address

Col. 1	Col. 2	Col. 3	Col. 4
Ca-51	Ca-131	Jya-66	Ca-22
Ayx-30	Ca-50	Ca-110	Oy-123
Ca-46	Ca-19	Ca-126	Mya-85
Jyb-24	Ca-83	Ca-60	Ca-57
Nx-84	Ca-142	Oy-139	Ca-161
Ca-68	Ca-122	Aa-15	Ca-8
Ca-64	Ap-95	Mya-118	Ayx-44
		Oy-43	Ca-54
		Ny-37	Ba-71
		Ba-67	Ba-159
		Ba-10	Sy-11
		Ny-48	Oy-117
		Ba-35	Jyb-127
		Ba-62	R-163
		Ba-29	Aa-156
		Ba-35	Aa-28
		Ba-63	Aa-1
		Dy-70	Fx-32
		Dy-135	R-133
		Ba-21	R-137
		Oy-138	Ax-4
		Je-33	Aya-47
		Ar-49	Ca-38
		Aya-13	S-27
		Ox-93	Ca-45
		D-17	Oy-111

Gas-Fired Cyclone

Lindberg Steel Treating Co. has announced a gas-fired Cyclone furnace as a companion to the electric Cyclone. Complete data in the form of diagrams, charts, photographs, and blueprints are found in a new catalog. Bulletin Jya-66.

Radio Principle

How a tried and accepted principle of radio engineering is successfully applied to industrial control instrumentation is described in a folder on a new low-price automatic controller by Wheelco Instruments Co. Bulletin Ca-110.

Silver Solder

Characteristics and uses of 12 standard compositions of silver solders meeting almost all requirements for this useful material are described in a folder by Handy & Harman, Inc. Bulletin Aa-126.

Inductive Heating

A reprint from *General Electric Review*, technical house organ of General Electric Co., is a detailed exposition of inductive heating by N. R. Stansel, industrial engineer for G. E. Bulletin Ca-60.

Castable Refractory

Properties, method of use, and applications of "Cast-Refract," a time and labor-saving castable refractory made by the Quigley Co., are given in Bulletin Oy-139.

Spoilage Fear

Fear of spoilage, says C. I. Hayes, Inc., may cost a firm more than actual tool loss through spoilage in the furnace. How "certain curtain" furnaces eliminate spoilage and spoilage fear is told in Bulletin Aa-15.

Grinding Lubrication

A handy outline for the selection of grinding wheels is one of the useful features of a booklet full of facts about grinding solutions. D. A. Stuart & Co. Bulletin Mya-118.

Salt Bath

"Heating from the inside out" is what makes the Ajax-Hullgren salt bath furnace practical. Ajax Electric Co. explains this new operating principle in an interesting folder. Bulletin Oy-43.

Rockwell Tester

A revised and completely up-to-date catalog on the well-known Rockwell hardness tester is well illustrated and contains 24 pages. Published by Wilson Mechanical Instrument Co., Inc. Bulletin Ca-22.

Ovens for Finishing

Despatch Oven Co. has two new bulletins featuring ovens for various finishing processes on such things as steel barrels, bed springs, cabinets, stoves and steel doors. Bulletin Oy-123.

Abrasion Resisting

Striking indeed is the yellow covered publication by Carnegie-Illinois Steel Corp. giving the history of AR steel, a low-priced abrasion resisting steel, and showing actual results in service as compared to ordinary mild steel. Bulletin Mya-85.

Diamond Wheels

A striking presentation is made by the Carborundum Co. in a 52-page booklet on diamond wheels. Detailed technical information is contained and a price list attached. Bulletin Ca-57.

Dust Collector

How the Schneible multi-wash dust and fume collector operates and what it does are clearly shown in a catalog giving details on existing installations. Published by Claude B. Schneible Co. Bulletin Ca-161.

4 to 6% Cr

Fifth of the series of beautifully printed booklets describing Republic Steel Corp.'s Enduro types is concerned with the 4 to 6% chromium steel. Its particular application to oil refining is described in detail. Bulletin Ca-8.

Pot Furnaces

Hevi Duty Electric Co.'s line of pot type furnaces for immersion heat treating; lead and salt bath treatment; melting and heating babbitt, lead, and solder; and for tinning and galvanizing is described in Bulletin Aysx-44.

Alcoa Notes

"Alcoa Random Notes" is the intriguing title of a little monthly paper got out by Aluminum Co. of America. A request for this bulletin will bring you a copy of the latest issue. Bulletin Ca-54.

Optimatic System

The Brown Optimatic System is a self-balancing automatic optical pyrometer which records temperature readings with the speed of light—the human eye is eliminated. It is described by Brown Instrument Co. in Bulletin Ny-3.

Stress-Strain Recorder

The many applications of the Baldwin-Southworth stress-strain recorder, its unique advantages, and the many ways it can give unusual service will be extremely interesting to all who have to do with testing methods and equipment. Bulletin Ba-67.

Electrodes

Recommended welding procedures for the new "Shield-Arc 100" electrode as well as all other Lincoln electrodes, are contained in the latest "Supplies Bulletin" published by Lincoln Electric Co. Bulletin Ba-10.

Electric Salt Baths

Literature is available from Bellis Heat Treating Co. describing electrically heated bath furnaces which are economical to operate and have a wide range of applications in hardening, annealing, and heat treatment of high speed steel, stainless steel, nickel, aluminum, copper and bronze, etc. Bulletin Ny-48.

Hard Case

A continuous breakdown test on Holden Hard Case heat treating bath is fully described and the remarkable results explained in a folder by A. F. Holden Co. Bulletin Ba-55.

Oil Testing

An oil testing instrument catalog issued by C. J. Tagliabue Mfg. Co. should be in the hands of every oil chemist as well as all those who are interested in testing machines. An up-to-date price list is included. Bulletin Ba-62.

Metal Surfaces

A manual giving in detail methods for the application of sodium cyanide solutions in the preparation of metal surfaces is announced by the R. & H. Chemicals Department, E. I. du Pont de Nemours & Co. Bulletin Ba-29.

Modern Metallograph

The new Bausch & Lomb research metallographic equipment, which is arousing so much interest and favorable comment in the profession, is the subject of advance literature, recently issued. Bulletin Ba-35.

Oxygen Lance

An eight-page booklet, profusely illustrated with diagrams and pictures, puts into convenient form much valuable information on the oxygen lance, which will be especially useful to anyone working with heavy sections of metal. The Linde Air Products Co. Bulletin Ba-63.

Sicromo

Timken Steel & Tube Co. has issued a new booklet on Sicromo steels which gives analyses of these new steels and discusses the effect of both silicon and chromium on oxidation resistance. Bulletin Ba-71.

Ovens

Machler recirculating ovens speed baking and reduce fuel costs. Why is told in a well-printed and illustrated booklet by The Paul Machler Co. Bulletin Ba-159.

Pot Furnaces

The new features of American Gas Furnace Co.'s improved pot hardening furnaces include insulating refractory lining backed by block insulation, heat resisting alloy burners, single valve control, numerous small burners with their attendant advantages, burner location and method of venting. Fully described in Bulletin Sy-11.

Testing Machines

An extremely handsome, spiral-bound, segregated catalog tells all about the various hydraulic and screw power testing machines made by Tinius Olsen Testing Machine Co. Bulletin Oy-147.

Newer Tool Steels

Vulcan Crucible Steel Co. has a complete and attractive catalog listing their full line of tool steels including many special types to meet the modern trends in industry. Bulletin Jyb-127.

Heading and Upsetting

A multitude of unusual parts, beautifully photographed and displayed in a folder by Lamson & Sessions Co., can now be produced by heading or upsetting to close tolerances and with an entirely satisfactory finish. The advantages of bolt-making methods are explained. Bulletin R-163.

Nickel Silver

Riverside Metal Co. has just published a beautiful booklet on nickel silver. If you want the latest information on this subject, presented in an attractive, interesting manner, write for Bulletin Aa-156.

EPI Microscope

The Zeiss EPI microscope for the illumination and observation of opaque material has unlimited applications for observing opaque material in dark field, bright field, and polarized light. A descriptive leaflet is published by Carl Zeiss, Inc. Bulletin Aa-28.

Brinell Tester

Accurate and exact measurements can be made on hard or soft materials with the Diamond Brinell hardness testing machine, which uses a pyramid-shaped diamond instead of a steel ball. Described in a pamphlet by Pittsburgh Instrument and Machine Co. Bulletin Aa-1.

Compressor Data

General information on the application of blowers to gas and oil burners, and miscellaneous applications for other types of work are included in a 12-page "Turbo Compressor Data Book." Useful tables and charts are included. Spencer Turbine Co. Bulletin Dy-70.

Laboratory Service

A new edition of "The Metal Analyst" tells about an organization established by Adolph Buehler specializing in the installation of metallurgical laboratories. The complete line of laboratory equipment marketed by Buehler is also catalogued. Bulletin Dy-135.

Stabilog

Ten outstanding advantages of the potentiometer Stabilog are fully explained in an attractively laid-out folder by the Foxboro Co. Bulletin Ba-21.

Port Valves

Diagrams and descriptive matter show the operation of adjustable port valves made by North American Mfg. Co. that are particularly suitable for mediums whose rate of flow is constant. Bulletin Oy-138.

Testing with Monotron

Shore Instrument & Mfg. Co. offers a new bulletin on Monotron hardness testing machines which function quickly and accurately under conditions of practice. Bulletin Je-33.

Heat Treating Manual

A folder of Chicago Flexible Shaft Co. contains conveniently arranged information on heat treating equipment for schools, laboratories and shops, and also illustrates the several types of Stewart industrial furnaces. Bulletin Ar-49.

Corrugated Ingots

The Gathmann Engineering Co. has published a new booklet called "Gathmann Ingot Molding—Their Purpose and Design." It illustrates various corrugated ingot contours designed to produce defect-free surface in steel ingots. Bulletin Aya-13.

Nickel-Copper Steels

Exceptional resistance to corrosion and abrasion, increased tensile strength, and higher ductility are the qualities claimed for Youngtown Sheet & Tube Co.'s new series of Nickel-Copper steels. A summary of properties and notes on their characteristics are contained in Bulletin Ox-93.

Heat Resisting Alloys

Authoritative information on alloy castings, especially the chromium-nickel and chromium-chromium alloys manufactured by General Atomics Co. to resist corrosion at high temperatures, is contained in Bulletin D-17.

Ni-Cr Castings

Compositions, properties, and uses of the nickel-chromium castings made by The Electro-Alloys Co. for heat, corrosion and abrasion resistance are concisely stated in a handy illustrated booklet. Bulletin Fx-32.

The Laboratory

The latest issue of Fisher Scientific Co.'s interesting little magazine, "The Laboratory," containing articles of historical and practical value, may be had by sending for Bulletin R-133.

Combustion Train

A highly efficient and practical combustion train for modern metallurgical laboratories is the Chevrolet Motors Type sold by E. H. Sargent & Co., dealers in laboratory supplies. Bulletin Ca-137.

Moly Matrix

Climax Molybdenum Co.'s little monthly newspaper contains many interesting and informative articles. Get the latest issue—Bulletin Ax-4.

Profile Projectors

A piece of equipment designed to meet the ever-increasing demand for optical measuring instruments of the highest precision is the Leco profile (contour) projector. Its many new construction features are illustrated and described in a 28-page pamphlet. Bulletin Aya-47.

Metal Working

Concise but informative is a little booklet by E. F. Houghton & Co. describing various metal working products—rust preventives, cutting fluids, metal cleaners, quenching oils, carburizers, pickling inhibitors, and miscellaneous products. Bulletin Ca-38.

Cast Vanadium Steel

Jerome Strauss and George L. Norris have written a technical booklet for Vanadium Corp. of America describing the properties developed by steel castings containing various percentages of vanadium. The information given is complete and authoritative. Bulletin S-27.

Monel for Strength

A publication by International Nickel Co. presents briefly, yet in an interesting and stimulating manner, the story of this nickel-copper alloy whose combination of mechanical properties and resistance to chemical corrosion has answered many problems of industry. Bulletin Ca-45.

Cleaning Processes

An attractive 12-page booklet entitled "Scientific Metal Cleaning" has been published by Detroit Rex Products Co. It describes in detail the applications and advantages of Detrex degreasing with Perm-A-Clor or Triad Solvents and the applications of Triad Alkaline Cleaning Compounds and Strippers. Bulletin Oy-111.

The Junior Members' Own Page

750
Junior
MembersHonorary Memberships
Are Awarded Students
Of Chicago Institutions

Honorary student awards were announced by the Chicago Chapter of the A.S.M. at the meeting on Jan. 14. These awards consist of junior memberships in the Society presented annually by the Chapter to outstanding students of educational institutions in the Chicago vicinity who are studying metallurgy or its associated sciences. Recipients of the 1936-37 awards are as follows:

University of Illinois—Clare B. Carlson, Howard W. Miner, John W. Sherman.

University of Chicago—Amos Dorinson, John Epp, Frank Smith.

Armour Institute of Technology—Paul R. Schultz, Boseley Wilhelm, Charles H. Skuza.

University of Valparaiso—Clyde Owen Beach, Glenn Augustus Erickson, David Walter.

Lewis Institute—Joseph Calandra, Thomas Mika, James Rivet.

Members and Officers of 2 New Groups

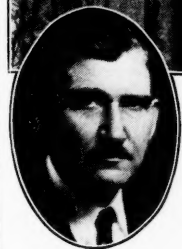


V.P.I. Student Group

Bottom Row (Left to Right)—J. W. Apperson, Vice-Chairman; E. P. Vanhorn; H. E. Grenoble, Chairman; W. T. Robins; R. C. Pultz.

Second Row—C. F. Cole; G. T. Mchalko; L. G. Probst; M. J. Zweig, Secretary-Treasurer; R. N. Lancaster.

Top Row—T. G. Barnes, Corresponding Secretary; E. A. Walker; C. O. Sundberg; Prof. H. V. White, Faculty Advisor; J. H. Parker; C. F. McCue.



C. Y. Clayton



C. L. Clayton

Bob Learns
About
Pearlite

"Why I ever picked a metallurgist for a room-mate I don't know. You do use the silliest-looking books, Al. Look at this picture—it looks like a thumb-print to me."

"That 'thumb-print' happens to be a piece of steel, if you really want to know, smart guy. It's a photomicrograph of pearlite."

"And what might a photomicrograph be?"

"Use your head, dumb-bell. It's a photograph taken under the microscope, of course. You see, Bob, they take a little piece of steel, grind and polish the surface to almost perfect smoothness, and etch it."

"I thought only artists did etching."

"It's the same principle. Metallurgists do it by putting the polished steel in an acid or some other compound which will color different parts of the structure in different ways so that it shows up better under the microscope."

"What do you mean, structure?"

"The structure is the pattern made by the constituents in the steel. The 'thumb-print' we're looking at shows pearlitic structure. The other photomicrographs in this book show other structures. Steel has a different make-up, depending on the amount of carbon and other elements in it. Heat treatment and rolling affect the structure too."

"Why is this one called pearlitic structure?"

"Well, the old bird who first polished and etched steel to see what was inside noticed that one of his samples had an iridescent or pearly appearance."

"Pearly steel—that's a good one. What makes it look that way?"

"Well, you see, when the steel is placed in the etching solution, the acid attacks the soft ferrite but doesn't affect the hard cementite."

"Wait a minute. You're way ahead of me. What's ferrite and what's cementite?"

"Well, if you hadn't flunked your Latin, you'd know that *ferrum* is the Latin word for iron and that's what ferrite is—pure iron. Pure iron, strange as it may seem to you, is soft and ductile like copper—that is, it can be easily bent or pulled."

"Well, then, what makes the steel hard?"

"Now you've asked a question that even the prof doesn't know the complete answer to yet. But he's got a pretty good idea, of course. That's where cementite comes in."

"I suppose you'll try to tell me that cementite gets its name from cement."

"Well, not exactly Portland cement, but cement has other meanings. It was derived from the cementation process, but we won't go into that now. Cementite is a chemical compound of three atoms of iron and one of carbon and its formula is Fe_3C —remember your chemistry, Bob? It's very hard and brittle—hard enough to scratch glass."

"But I still don't see the connection between this pearlitic structure and the soft ferrite and hard cementite."

"Pearlite is simply a mixture of

(Continued on page 8)

Uncle Dud talks to the juniors

Dear Juniors:

Inasmuch as I intend to speak my mind to you juniors, whether you are now in school or industry, and inasmuch as I plan to scold, and pat, and "raise hell" every once in a while, it seemed that I should sign my name "Uncle Dud" because, as you know, a relative always has the privilege (and usually takes advantage of it) of raising heck with his kin.

Now Uncle "Dud" doesn't mean that's what I am. It is simply an abbreviation for my full name, Dudley, but you will probably call me worse names than Dud after you read some of my tirades.

The first thing that comes to my mind is an "example" which I think it might be well for you youngsters to follow.

It happened that a brother-in-law of mine, just graduated from Washington University at St. Louis, had majored in business administration. He wasn't any "wiz" in his studies and neither was he a grind, but I think he enjoyed college life as much as the average young man.

When Bill got his sheepskin he didn't know just exactly what to do because he wasn't properly prepared for any special vocation. He mosed around the house for a while during the summer and did some odd jobs, and then he had the happy idea that he would go out and look for a real job.

The first place he went was to the employment department of the Rayon Corp. and filed his application. Three or four days later he was called to report for work.

When he told me about it, I said, "Bill, you are going to work for a fine corporation. It's a new industry, it's a coming industry, and it will offer you a good future if you want it. I have only one piece of advice to give you, 'Don't watch the clock.'"

I explained to him what he probably already knew, that when young men go into a plant to work, they are really under observation and if they show a real interest in their work and make the job something that has to be done and done properly, no matter how much time it takes, they thus indicate the proper attitude toward the organiza-

tion, and they can depend upon it that the organization is going to assume a proper attitude toward them. And that was the way it worked out.

Bill hadn't been there very long until I observed that many evenings he didn't come home until eight or nine o'clock, and that on Saturday afternoons he was usually on the job instead of following the fortunes of a football team.

I could quite easily observe that his superiors were constantly placing more and more responsibility upon him, and while sometimes he felt he was being worked too hard, nevertheless, he kept at it without grumbling or complaining.

Two years have now passed and what is the result? It is this: Bill has had three increases in salary, and now is head of the planning department, where he has full responsibility for the allocation of orders to the manufacturing department and final delivery to the customer. Bill has seen many young men come and go in this department.

I know it used to make me pretty mad when Dad held somebody up to me as the shining example of what I should do or be, and I am not holding Bill up as someone who has done an extraordinary job. I am mentioning Bill simply because of his attitude toward his work. If you will go out to lick the job, no matter how much time it may take, your work is going to take care of you and you will at the same time get a big kick out of doing the work.

Some of you juniors are going out into industry this summer for the first time, some of you are already apprenticed in industry, and your old Uncle Dud just wants to say one thing to you—he just wants to give you one motto:

DON'T WATCH THE CLOCK!

Sincerely yours,

Uncle Dud

P.S.: If any of you juniors would like to write to your Uncle Dud about the experiences you have had or are about to have, I will be glad to hear from you. Address me % THE REVIEW, 7016 Euclid Ave., Cleveland, Ohio.

New Group Is Formed at
Missouri School of Mines

A new student group of the A.S.M. has been formed at Missouri School of Mines and Metallurgy, University of Missouri, Rolla.

The Group contains 16 charter members, and its officers are: R. C. Tittel, chairman; W. P. Ruemmler, vice-chairman; Charles Lee Clayton, secretary-treasurer; and Charles Y. Clayton, faculty advisor.

Two meetings were held during January, before organization of the Group. At these meetings W. E. Remmers, assistant to the sales manager, Electro Metallurgical Sales Corp. of Chicago, talked on Ferro-Alloys, and Harry Kessler, metallurgical engineer, Sorbomat Process Engineers, St. Louis, talked on Manufacture of Cast Iron.

V.P.I. Officers Elected

H. E. Grenoble has been elected chairman of the recently organized Virginia Polytechnic Institute Group of the Society. J. W. Apperson is vice-chairman, M. J. Zweig secretary-treasurer, and H. V. White faculty advisor.

The Group now numbers 18 members and weekly meetings are being held. Most of the speakers have so far been students.



WHY IS STAINLESS STEEL STAINLESS?
\$5.00 PRIZE FOR BEST ANSWER

THE REVIEW will pay \$5.00 for the best answer to this question submitted by a member of the American Society for Metals.

Answers will be judged on the basis of understandability to the layman. They must be technically accurate, yet must be understandable to a person with no metallurgical or technical training.

Mail your explanation to THE REVIEW, 7016 Euclid Ave., Cleveland, Ohio, no later than Saturday, April 3. All answers accepted for publication will be paid for at the rate of \$5.00 each. No entries will be returned.

Bob Learns About Pearlite

(Continued from page 7)

ferrite and cementite, deposited in alternating plates or layers."

"And what about this etching business now?"

"The acid, as I said, attacks the soft ferrite, but not the harder cementite. The ferrite, which was eaten away, reflects the light imperfectly (you know, of course, that you have to have the right kind of light to take photographs even under the microscope) and the ferrite appears as the black lines in your 'thumb-print' here. The white lines are the unattacked ridges of cementite which remain flat and reflect the light."

"Can you see the etched pearlite in the steel without the microscope?"

"Hardly. This sample was magnified 1000 diameters. It was etched in 1% nitral which is a solution of 1 part nitric acid and 99 parts alcohol."

"Hm, sounds quite simple after all. I suppose those layers —"

"Lamellae, old thing."

"Well, then, those lamellae of hard cementite mixed up in the soft iron give the steel its hardness."

"That's the idea exactly. So you do have a brain! But it's not so simple as you think. Pearlite is only found in annealed steels. Hardened steels are something entirely different again."

"Yes, but all this metallurgy won't get me a grade in history. Tell me about that some other time."

Employment Service

Address answers care of A. S. M., 7016 Euclid Ave., Cleveland, unless otherwise stated

Positions Wanted

MATERIALS ENGINEER: Long experience in mechanics, ferrous and non-ferrous metals and other materials. Has had charge of all plant technical work and inspection as well as layout and development of procedures. Is well qualified for plant maintenance and operation. Box 3-5.

PROFESSOR OF METALLURGY and metallurgy desires industrial position. Has taught for four years and had previous experience in testing laboratories, heat treating, research and cast iron. Age 35. Box 3-10.

GRADUATE METALLURGICAL ENGINEER (1934) has had experience in the steel mills, research departments, and sales engineering work. Now employed with one of the leading steel tubular manufacturers, desires a position in research or sales engineering work having a future. Special work done in high pressure, and high and low temperature service. Available on short notice. Box 3-15.

Positions Open

METALLURGICAL ENGINEER familiar with low carbon steel and 18-8 fabrication. Should be well educated in metallurgy and metallography. Starting salary about \$20 per month. Opportunity to advance to chief metallurgist. Plant located in Ohio. Reply giving complete details and references in the first letter. Box 3-20.

SALES ENGINEER with outstanding personality, excellent character, good engineering education and some industrial plant experience to sell well-known line of automatic control equipment and instruments for industrial use. Excellent line of promotion for young man who is prepared to take specialized training course and secure broadening experience in various locations. Candidates, therefore, preferred 25 to 35 years old. Write stating age, education, experience and salary desired. Box 3-25.

YOUNG ENGINEERING school graduates of outstanding character and excellent personality to train for field work as sales engineers for well-known manufacturer of industrial instruments and automatic control equipment. Candidates preferred who have had some industrial plant or public utilities experience and are under 30 and now free for quick transfers and extensive travel. Unusual opportunities for promotions. Write stating age, education, experience and salary desired. Box 3-30.

ASSISTANT PROFESSOR of metallurgy and chemistry. Salary \$3100. Communicate immediately. Position must be filled July first. Box 3-35.

Heat Resisting Castings Come Under 3 Types

All Are Essentially Fe-Cr Alloys And Many Contain Nickel

By F. J. Comerford

Rochester Chapter — Telling what a radio broadcaster has to contend with, Al Sigl, radio news commentator for Station WHEC, presented a great story of the humane side of radio at the dinner preceding the meeting Dec. 14.

The main speaker, J. D. Corfield, alloy sales manager, Michigan Steel Casting Co., spoke on heat and corrosion resisting castings.

Mr. Corfield stated that all heat resisting castings are essentially alloys of iron and chromium in which the chromium serves to inhibit high temperature corrosion, nickel also being added to intensify the action of chromium and to enhance the physical properties.

Chromium content varies from 12 to 30% and nickel content from 8 to

Technical Papers Invited

All members of the Society are cordially invited to submit technical papers to the Publication Committee for its consideration for presentation at the next annual convention.

Information and suggestions for the preparation of manuscripts to be reviewed by the Committee will be sent upon request to the National Office, A.S.M.

65%. There are three types, nickel-chromium alloys, chromium-nickel alloys, and straight chromium alloys.

Under purely oxidizing conditions any of the three types may be used, choice depending upon temperature and physical properties of the metal at elevated temperature. Under reducing conditions (in the absence of sulphur compounds) the nickel-chromium alloys are generally preferred because they do not carburize. In the presence of sulphur compounds it is customary to select a chromium-nickel alloy.

Mr. Corfield also brought up the question of casting design. He explained and illustrated by slides that it is preferable to design sections of symmetrical proportions such as the I-beam and rectangle, then channels, angles and tees, which are eccentric to at least one axis.

Mr. Corfield pointed out that the theory of intercrystalline corrosion is based upon the phenomenon of carbide precipitation.

To prevent it, either carbon content should be kept so low that chromium loss due to precipitated carbides is negligible, or chromium content should be increased so that in spite of local loss of chromium, there would always be sufficient left in solution to maintain the alloys in a passive condition.

According to Mr. Corfield, the latter is by far the more satisfactory expedient with castings, since with high chromium content more carbon is permissible, and consequently the metal is more fluid at normal pouring temperatures, which facilitates the production of sound castings.

The rolling mills, on the other hand, can add only a limited amount of chromium and nickel before rolling problems become insurmountable. Consequently, they must rely upon a low carbon content and the addition of stabilizing elements such as molybdenum or titanium.

\$200,000 Arc Welding Contest Announced

James F. Lincoln Foundation Offers 446 Prizes for Scientific Papers on Arc Welding; First Prize \$13,700

Four hundred and forty-six prizes totaling \$200,000 are offered by the James F. Lincoln Arc Welding Foundation for scientific papers on the subject of arc welding.

The purpose of the contest is to stimulate intensive study of arc welding, according to A. F. Davis, secretary of the Foundation.

The winner of the grand prize will receive not less than \$13,700 for his paper. Other prizes range from \$7500 to \$100.

In order to assure equal competitive opportunity, similar prizes are offered in the 11 major divisions covered by the contest. These divisions are: Automotive, Aircraft, Railroad, Watercraft, Structural, Furniture and Fixtures, Commercial Welding, Containers, Welderies, Functional Machinery, and Industrial Machinery.

These 11 main classifications are further divided into 44 sub-classifications, with winning papers in each sub-classification receiving substantial prizes in addition to the main prizes of the contest.

To participate in this contest, it is only necessary that the papers submitted describe either the re-design of an existing machine, structure, or building, so that arc welding may be applied to its manufacture; or present

a design (either in whole or in part) of a machine, structure, or building not previously made — the description should show how a useful result, which was impractical with other methods of construction or could better be done by arc welding, is obtained.

The contest will remain open until June 1, 1938. All communications relative to the contest should be addressed to the Secretary, The James F. Lincoln Arc Welding Foundation, P. O. Box 5728, Cleveland, Ohio.

New York Spring Course

The spring educational course of the New York Chapter consists of lectures by recognized authorities on copper, aluminum, nickel and alloys of industrial importance (metallography and practice).

Lecturers are qualified by wide practical experience and theoretical knowledge in their respective fields.

Meetings are held every Monday for six weeks starting March 1. The course is free to members of the Society. Further information can be obtained from J. R. Vilella, U. S. Steel Corp. Research Laboratories, Kearny, N. J., who is chairman of the Educational Committee.

CHAPTER CALENDAR

DATE	CHAPTER	PLACE	SPEAKER	SUBJECT
Mar. 22	Southern Tier	Jenkins Inn, Waverly, N. Y.	J. R. Freeman, Jr.	Copper and Copper Alloys
Mar. 25	Milwaukee	Milwaukee Athletic Club	E. J. Janitzky	Steel Metallurgy
Mar. 26	Philadelphia	Engineers Club	James T. Kemp	Brasses and Bronzes
Mar. 28	Muncie	Anderson, Ind.	Mr. Beck	Machinability
Apr. 2	Boston	Chamber of Commerce	G. B. Waterhouse	Sustaining Members' Night
Apr. 2	Lehigh Valley	Hotel Traylor, Allentown, Pa.	H. C. Mann	Testing
Apr. 2	Ontario	Royal York Hotel, Toronto	Dr. H. W. Gillett	The Use of Molybdenum in Ferrous Metallurgy
Apr. 5	Cleveland	Cleveland Club	H. C. Mann	Impact Testing
Apr. 5	Mahoning Valley	Tod Hotel, Youngstown	Zay Jeffries	
Apr. 5	Montreal	Windsor Hotel	E. C. Bain	Anomalies in the Heat Treatment of Steel
Apr. 7	Dayton	Providence Engineering Society	A. W. F. Green	Saga of Fine Steel
Apr. 7	Rhode Island			Refractories
Apr. 7	York	Harrisburg, Pa.	C. H. Herty, Jr.	Alloy Steels in the Open Hearth
Apr. 8	Buffalo	Hotel Buffalo	F. B. Foley	Steel Making
Apr. 8	Chicago	Medinah Club	W. H. Oldacre	Machinability and Cutting Operations
Apr. 8	Los Angeles	Southern Calif. Edison Auditorium	J. H. Spade and A. Maradudin	Stress Analysis
Apr. 8	Pittsburgh	Roosevelt Hotel	G. E. Doan	Invisible Radiography
Apr. 12	Baltimore	Engineers Club	Dr. R. A. Wilkins	Non-Ferrous Alloys
Apr. 12	Detroit	Hotel Fort Shelby	H. W. McQuaid	Grain Size, Normalizing and Hardening
Apr. 12	New Jersey	Essex House, Newark	C. G. Fink	Corrosion
Apr. 12	Peoria		H. P. Croft	Forging Brass and Bronze
Apr. 12	Rochester	Room 208, Engineering Bldg., University of Rochester	M. A. Grossmann	Alloying Elements and Grain Size
Apr. 12	Washington	Garden Room, Dodge Hotel	K. R. Van Horn	Radiography and X-Ray Analysis
Apr. 13	Hartford		Carl Hewitt and L. A. Lanning	Carburizing Symposium
Apr. 13	North West	Minnesota Union	H. W. Butterbaugh	Copper and Copper Alloys
Apr. 13	Tri-City	Rock Island Arsenal	E. C. Bain	Anomalies in Hardening
Apr. 14	Syracuse			Joint Meeting with Southern Tier
Apr. 15	Canton-Mass.	Hotel Onesto, Canton, Ohio	H. W. Gillett	Furnace Atmospheres
Apr. 15	New Haven	Hammond Laboratory, Yale University	G. J. Comstock	Powder Metallurgy
Apr. 16	St. Louis	Granite City, Ill.		Plant Inspection of The Granite City Steel Co.
Apr. 19	New York	Third Floor, International Bldg., Rockefeller Center	Everett Chapman	Stresses in Welded Joints
Apr. 19	Southern Tier	Cornell University, Ithaca, N. Y.	T. H. Nelson	Comparison Between Welding Melters and Heat Treating
Apr. 20	Schenectady	Rensselaer Polytechnic Institute, Troy, N. Y.	G. E. Doan	Radiographic Testing
Apr. 24	Chicago and Notre Dame	Engineering Bldg., Notre Dame University	A. B. Kinzel	Deoxidizing and Alloying
Apr. 28	Columbus, Dayton and Cincinnati	Columbus		Tri-Chapter Meeting
Apr. 30	Philadelphia	Engineers Club	J. S. Vanick	Modern Cast Irons
Apr. 30	Milwaukee	Milwaukee Athletic Club	A. B. Kinzel	
Apr. 30	Muncie	New Castle, Ind.	E. G. DeCrolis	Radiant Tube Furnaces
Apr. 30	Penn State	Min. Ind. Bldg., Penn State College, State College, Pa.	C. H. Herty, Jr.	Grain Size in Steel
Apr. 30	Worcester			Physical Testing